

The Mars Pathfinder Mission and Science Results

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Mars Pathfinder successfully landed on the surface of Mars on July 4, 1997, deployed and navigated a small rover 100 m clockwise around the lander, and collected data from 3 science instruments and 10 technology experiments. The mission operated on Mars for 3 months and returned 2.3 Gbits of new data, including over 16,500 lander and 550 rover images, 16 chemical analyses of rocks and soil, and 8.5 million individual temperature, pressure and wind measurements. The mission captured the imagination of the public, garnered front page headlines during the first week, and became the largest internet event in history. The moment of inertia indicates a central metallic core of 1300-2000 km in radius. Dark rocks appear to be high in silica and geochemically similar to anorogenic andesites (or icelandites) that formed by fractional crystallization of mantle derived parent materials. Rounded pebbles and cobbles and a possible conglomerate suggest fluvial processes that imply liquid water in equilibrium with the atmosphere and thus a warmer and wetter past. Composite airborne dust particles appear magnetized by freeze dried maghemite stain or cement that may have been leached from crustal materials by an active hydrologic cycle. Remote sensing data at a scale of generally greater than ~1 km and an Earth analog correctly predicted a rocky plain safe for landing and roving with a variety of rocks deposited by catastrophic floods that are relatively dust free. The surface appears to have changed little since being formed billions of years ago.